HIV/AIDS Education Project

Significant Trends in the lowa YRBS

1997 to 2005: Iowa High Schools



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Introduction

The Youth Risk Behavior Surveillance System is an epidemiologic system established by the U.S. Centers for Disease Control and Prevention (CDC) to help monitor the prevalence of behaviors that put youth at risk for the most serious health and social problems that can occur during adolescence and adulthood. The Youth Risk Behavior Survey (YRBS) is the measurement instrument of this system. This survey is used by the State of Iowa to monitor these behaviors among its young people. Specifically, this survey focuses on students who were attending high schools (Grades 9 through 12, traditional and alternative schools) in Iowa during 2004-05.

The YRBS was developed cooperatively by the Division of Adolescent and School Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention (CDC), 19 other federal agencies, 71 state and local departments of education, and national education and health organizations. It was administered in about 40 states in 2005. The survey consists of 87 questions and is presented in the Appendix.

Evidence of Health and Social Problems among Youth in the United States

According to the Iowa Department of Public Health, of Iowa youth aged 15-19 who died, the majority are due to (1) motor vehicle accidents, (2) other unintentional injuries, (3) homicides and legal intervention, and (4) suicides (e.g., Veale, 2004). These factors also cause acute and chronic morbidity among our youth.

Young people suffer significant morbidity from a high rate of unintended pregnancy that occurs among teenagers every year. This is one factor contributing to an infant mortality rate of 6.9 per 1000 live births occurring in the United States in 2003 (*The World Almanac and Book of Facts 2006*, 2006) and 5.1 per 1000 live births occurring among Iowa residents in 2004 (Deb Roeder, personal communication, February 16, 2006). In addition, serious health problems result from sexually transmitted diseases (STDs), including Acquired Immune Deficiency Syndrome (AIDS) that are contracted by teenagers every year. According to the National Center for Health Statistics in the U.S. Department of Health and Human Services, 13.1% of the 44,232 cases of AIDS reported in the United States in 2003 were 13 to 29 years old (*The World Almanac and Book of Facts 2006*, 2006).

Other behaviors that lead to mortality, morbidity, and social problems among teenagers include the following:

- drinking and driving
- alcohol and other drug use
- tobacco use (smoking or chewing)
- dietary excesses and imbalances
- insufficient physical activity

Some of these behaviors, such as drinking and driving, result in mortality, morbidity, and social problems during the teenage years. Others, such as tobacco use, dietary excesses and imbalances, and physical inactivity are known to lead to diseases which occur later in life (such as cancer, diabetes, and heart disease). These behaviors and their associated problems are largely preventable through education, counseling, mentoring, treatment, and other programs.

The Six Risk Areas

In 1988, the CDC began a process to identify and monitor critical health behaviors among youth. Behaviors leading to mortality, morbidity, and social problems were analyzed and categorized into six risk areas:

- (1) behaviors that lead to intentional or unintentional injuries
- (2) tobacco use
- (3) alcohol and other drugs
- (4) sexual behaviors that result in HIV infection, other STDs, or unintended pregnancies
- (5) dietary behaviors
- (6) physical inactivity

Survey questions addressed behaviors in each of the above six risk areas. In addition, in the 2005 YRBS, two questions about asthma were included.

The purpose of the Iowa Youth Risk Behavior Survey (YRBS) is to assist educators and health professionals in the state in determining the prevalence of behaviors or factors that put Iowa youth at risk. This determination will be used to focus education in a continuing effort to reduce the risk factors that affect Iowa youth.

Purpose of the Study

The purpose of this study is to examine the changes or trend between the results on questions that were asked in the 1997 and 2005 Iowa YRBS. The reason these two years were chosen and the nature of the analyses employed will be discussed in the "Survey Methods and Data Analysis" section.

Survey Methods and Data Analysis

The 2005 Youth Risk Behavior Survey (YRBS) instrument consisted of 87 questions which were used to assess students in the six critical areas of health risk. In 1997, the YRBS instrument consisted of 84 questions distributed over the same six critical areas of health risk. Fifty-six questions were considered equivalent so comparisons could be made over the two years.

Sampling Method

Statistical sampling was used to reduce the number of students needed to complete the survey and control the accuracy and precision of the resulting estimates. In the 2005 Iowa YRBS, all public schools containing Grades 9, 10, 11, or 12 were included in the sampling frame or population. Schools were selected systematically with probability proportional to size of enrollment in Grades 9 through 12 using a random starting point. Altogether, 40 schools were sampled. This constitutes the school-level part of the sampling process. The same process was used in 1997 and the same number of schools were sampled that year.

All classes meeting during the second period of the day were included in the sampling frame. Systematic equal probability sampling with a random starting point was used to select classes from each school that participated in the survey. This constitutes the student- or class-level part of the sampling process.

Survey Process

Superintendents and principals associated with schools selected for the YRBS were contacted in the winter of 2004-05 to obtain their cooperation. Each participating school submitted a list of second period classes and a random sample of these classes was selected and surveyed. The survey booklets and instructions were then mailed to each school. Parent notification forms were provided participating schools to secure parental approval as needed. As stated in those forms, the survey procedures had been designed to protect their child's privacy and allow for anonymous participation. Only group-level statistical data were produced and no student or school name appears in this or any Iowa Department of Education report. Participation in the survey was voluntary. The same survey process was used in the 1997 Iowa YRBS.

Response Rates and Weighted Data

At the school level in the 2005 Iowa YRBS, 30 of the 40 schools (75%) participated. At the classroom level, 1,359 out of 1,564 of the students sampled (87%) completed usable questionnaires.

The overall response rate was

$$(.75)(.87) \times 100\%$$

or 65%. Overall response rates exceeding 60% are required for the data to be weighted. Thus, the 2005 YRBS data were weighted. This means that these results can be generalized to all high school students in public schools in the state of Iowa and will be included in the report on the YRBS by the CDC—the results of national sample and those of the participating states. In the 1997 Iowa YRBS, an overall response rate of 71% was achieved (Veale, 1998). The 1997 YRBS data were also weighted and were generalized to all high school students in public schools in the state during that year. These two years were the only ones in which the Iowa YRBS data were weighted using the current (60%) criterion.

Weights were associated with each questionnaire to (a) reflect the likelihood of sampling each student and (b) reduce bias by compensating for differing patterns of nonresponse. The details of

the weighting process for the 2005 Iowa YRBS is presented in the "Sampling and Weighting" section of the full summary by the CDC (Centers for Disease Control and Prevention, 2005).

Data Analysis

The data analysis consists of the following:

- (1) Comparison of the 1997 and 2005 Iowa YRBS results for questions that were asked in both years and yielded statistically significant differences for the total samples over the two years (i.e., significant linear trend);
- (2) Determination of whether or not the 2003 Iowa YRBS (nonweighted) results for these questions fell between those of 1997 and 2005 (i.e., approximately fit the linear trend);
- (3) Comparison of the 1997 and 2005 Iowa YRBS results for questions that were asked in both years and yielded statistically significant differences *for each gender* over the two years (i.e., significant gender-specific linear trend).

A logistic regression analysis controlling for changes in distributions over gender (sex), race/ethnicity, and grade level was conducted to test for the statistical significance of the linear trend (difference over the two years). The .05 level of significance was used in these analysis.

1997 and 2005 Iowa YRBS:

Statistically Significant Outcomes

Comparisons or trends on the YRBS questions from 1997 to 2005 were made using logistic regression analysis, controlling for changes in distributions by sex, race/ethnicity, and grade level. These two years were chosen because they are the only years to date in which the Iowa YRBS data were weighted according to current criteria (minimum overall response rate of 60%).

Results for the Total Samples

The following outcomes corresponding to YRBS survey questions showed statistically significant changes in response from 1997 to 2005 for the total samples. Twenty-two (22) of the 56 questions asked both years yielded statistically significant changes or 39%. In addition, the results from the 2003 Iowa YRBS are shown. The 2003 results were not weighted and, thus, should be viewed with some caution. They are included to see whether they approximately fit the trend. When the nonweighted 2003 percentage fell between the weighted 1997 and 2005 percentages, it was said to "fit the (linear) trend" in the sense that one would expect the percentage in an intervening year to be somewhere between the two end points anchoring the trend (indicated by a check mark (\checkmark)) after the 2003 results).\(^1\)

Table 1: Results on YRBS questions showing statistically significant change from 1997 to 2005, including nonweighted result from 2003 and whether it fits the trend (indicated by ✓).

Question #	Outcome	1997	2003*	2005	Percentage Change 1997 to 2005 (Signed Difference)
9	Never or rarely wore a seat belt when riding in a car driven by someone else	12.6	7.6 (🗸)	7.5	- 5.1
10	Rode in a car or other vehicle driven by someone who had been drinking alcohol one or more times during the past 30 days	40.4	36.3 (✔)	30.6	- 9.8
14	Carried a weapon such as a gun, knife, or club on school property on one or more of the past 30 days	8.6	4.6 (✔)	4.3	- 4.3
24	Seriously considered at- tempting suicide during the past 12 months	23.0	14.9	16.2	- 6.8

¹ The data from the YRBS in the other intervening years, 1999 and 2001, were also not weighted. Regular and alternative samples were selected separately, unlike in 1997, 2003, and 2005 when the two types of high schools were combined and a single sample drawn. Data from those two years (1999 and 2001) were not included in this trend analysis.

Question #	Outcome	1997	2003*	2005	Percentage Change 1997 to 2005 (Signed Difference)
25	Made a plan about how they would attempt sui- cide during the past 12 months	18.6	13.0 (✔)	13.0	- 5.6
28	Ever tried cigarette smoking, even one or two puffs	66.9	56.4 (🗸)	49.6	- 17.3
29	Smoked a whole cigarette for the first time before age 13 years	19.6	19.5 (🗸)	15.0	- 4.6
30	Smoked cigarettes on one or more of the past 30 days	37.5	26.1 (🗸)	22.2	- 15.3
30	Smoked cigarettes on 20 or more of the past 30 days	18.0	15.6 (🗸)	9.7	- 8.3
31	Among students who are current smokers, smoked more than 10 cigarettes per day on the days they smoked during the past 30 days	17.9	17.9 (⁄) ²	8.8	- 9.1
33	Smoked cigarettes on school property on one or more of the past 30 days	15.9	7.0 (🗸)	6.5	- 9.4
36	Used chewing tobacco, snuff, or dip on one or more of the past 30 days	12.8	6.6	7.9	- 4.9
35	Used chewing tobacco, snuff, or dip on school property on one or more of the past 30 days	6.6	3.0	3.9	- 2.7
40	Had their first drink of alcohol other than a few sips before age 13 years	28.9	23.3 (🗸)	22.3	- 6.6

² This value was estimated from the 2003 Iowa YRBS data, namely, the number of students smoking at least 10 cigarettes per day (responses to "F" and "G" in Question 31) divided by the of students who smoked during the past 30 days (total number of responses minus responses to "A" in Question 31) in the 2003 YRBS questionnaire (Centers for Disease Control and Prevention, 2003).

Question #	Outcome	1997	2003*	2005	Percentage Change 1997 to 2005 (Signed Difference)
41	Had at least one drink of alcohol on one or more of the past 30 days	52.1	50.5 (✔)	43.8	- 8.3
42	Had five or more drinks of alcohol in a row, that is, within a couple of hours, on one or more of the past 30 days ("binge drinking")	37.5	35.5 (✔)	31.0	- 6.5
50	Sniffed glue, breathed the contents of aerosol cans, or inhaled any paints or sprays to get high one or more times during their life	16.9	9.2	10.3	- 6.6
56	Was offered, sold, or given an illegal drug on school property by someone during the past 12 months	22.8	13.5	15.5	- 7.3
62	Among students who had sexual intercourse during the past three months, used a condom during last sexual intercourse	47.6	63.6	61.8	14.2
85	Had ever been taught in school about AIDS or HIV infection	92.4	85.5	85.6	- 6.8
66	Exercised to lose weight or to keep from gaining weight during the past 30 days	54.2	58.1 (✔)	64.7	10.5
83	Among students enrolled in physical education (PE) class, actually exercised or played sports more than 20 minutes during an av- erage PE class	67.1	81.1 (🗸)	83.9	16.8

^{*} Nonweighted data (interpret with caution).

1. Summary of the Results Based on the 1997 and 2005 Iowa YRBS Data

All of the above statistically significant results were positive (negative outcomes had negative percentage change, positive ones had positive percentage change)—except for having ever been

taught in school about AIDS or HIV infection which was addressed in Question 85. The percentage of students who indicated they had been taught about HIV or AIDS decreased significantly from 92.4% in 1997 to 85.6% in 2005. On the other hand, in the 2004 School Health Profile based on responses from the lead health education teachers, 96% indicated they tried to increase student knowledge in the area of HIV prevention (Veale, 2005). It may be that some students responded "No" to this question if they did not take a specific course unit on HIV and AIDS.

Tobacco use was the risk area showing the most statistically significant improvement from 1997 to 2005. Improvement was indicated on all eight of the questions regarding tobacco use that were asked both years. "Binge drinking" was another important area of improvement—the percentage of students involved in this risky behavior decreased from 37.5% in 1997 to 31.0% in 2005. Some degree of improvement was evidenced in each of the six health risk areas by high school students in Iowa from 1997 to 2005.

The statistical analysis (logistic regression) used for this assessment "provides an accurate test of change over long periods of time" (Centers for Disease Control and Prevention, 2005). The eight years from 1997 to 2005 may be considered a fairly long period of time in this context. This adds strength to the above very positive results.

2. Comparison of the 2003 Results with the Trend Based on the 1997 and 2005 Iowa YRBS Data

Although the data were not weighted in 2003, we thought it would be interesting to see how the results for these survey questions compared with those of 1997 and 2005 (Sara Peterson, personal communication, February 2006). If they followed the trend, one would expect that the 2003 percentages should be *somewhere between the 1997 and 2005 percentages*. This was true for 15 of

the 22 survey questions on which there was a statistically significant change (indicated by a check mark in Table 1)—or 68%. In some of these cases, the 2003 percentage appeared to be almost exactly equal to the estimated value based on the line connecting the 1997 and 2005 values, e.g., the survey item about whether the student had smoked cigarettes during the past 30 days (see Figure 1).

The 2003 percentages that fell outside the interval defined by the 1997 and 2005 percentages typically didn't miss the estimated value by very much, e.g., the

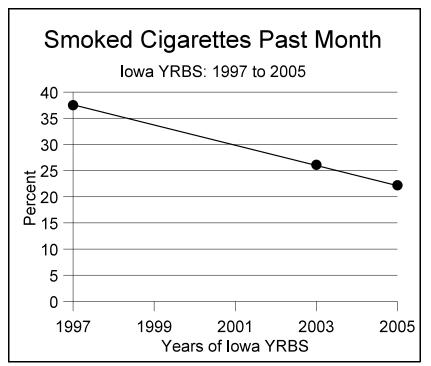


Figure 1: Trend results for survey question on smoking cigarettes during the past 30 days: 1997, 2003, and 2005 (good agreement between nonweighted and weighted results).

³ The increase in binge drinking over grade levels from 9th to 12th grade remains troubling, however (Veale, 2006).

survey item about whether the student used a condom during their last sexual intercourse, among those who had intercourse during the past three months (see Figure 2).

Over two-thirds (68%) of the nonweighted results from the 2003 YRBS fit the pattern of the (crude linear) trend based on weighted YRBS data from 1997 and 2005. Clearly, this agreement supports the results on change based on the two years of weighted data by providing another (mostly) confirmatory data point—albeit one with less accuracy or credibility.

In addition, we feel that this high level of agreement between the nonweighted and weighted data lends some credence to the use of

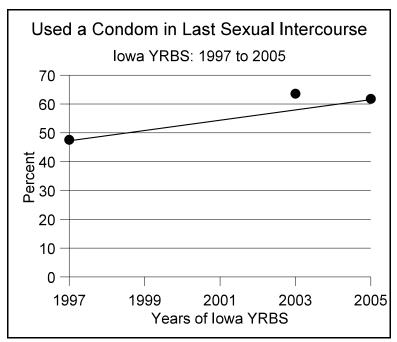


Figure 2: Trend results on question about using a condom in last sexual intercourse, among those who had intercourse in past three months: 1997, 2003, and 2005 (fair agreement between nonweighted and weighted results).

nonweighted data for providing *rough prevalence estimates* on health risk behaviors for students in the state. For example, suppose the YRBS response rate for some year turned out to be, say, 56%. The data for that year would not be weighted and the CDC convention is that the data should be used only to make statements about the risk behaviors of the students actually surveyed, i.e., those *in the sample*. However, in this hypothetical case we would be only 4% under the required 60% for weighting. Also, the difference between the weighted percentages and the raw percentages is typically not more than 1 or 2 percent. The results of this study indicate that nonweighted results may not be far off the trend estimates based on weighted results from other years. Thus, if we are not too far under the 60% response rate (as with our hypothetical example), nonweighted results may provide rough estimates for the population of interest, e.g., high school students in Iowa. The convention that data from samples in which the response rate falls below 60% can only be used to make statements about the students in the sample (and not about the overall population) may be overly conservative.

Note of caution: In 2003, we achieved an overall response rate of 48%. This was 12% under the 60% criterion for weighted data. Even with this relatively low response rate, we achieved good agreement between the nonweighted results and the estimates based on the trends using the weighted data. Lower levels of response would undoubtedly have yielded lower levels of agreement with these trends. Nonweighted data should be used with caution when the response rate is substantially below 60%. Moreover, the assessment of the "trend" is really only an assessment of the statistical significance of the difference or change from the first year (1997) to the second year (2005) that weighted results were achieved. Although these assessments are considered more accurate when the time interval is "long" (8 years, in this application), the slope of the crude trend line is based on only two points (for 1997 and 2005) and the above results based thereon should be interpreted with some caution.

3. Some Hypotheses for What Caused the Improvement in Student Health Risk Prevalence

The YRBS is a monitoring or surveillance system and is not linked to any educational program or treatment. Although causal relationships may not be inferred, Safe Schools/Healthy Students and other drug and violence prevention programs, Iowa's School-Based Youth Services programs, Success 4, Positive Behavior Supports, character education, HIV prevention education and skill building, and other programs and legislation supporting children and families in Iowa have undoubtedly contributed to some of these positive results.

In particular, the dramatic improvement in the risk area of tobacco use may be due in part to federal rules regarding cigarette advertising directed to children, increased and improved education⁴ regarding tobacco use as a serious health risk, and the increasing social unacceptability of smoking.

Results for the Gender Subgroups

The results on change from the 1997 to 2005 YRBS for the gender subgroups were similar to those of the total samples. For females, the following questions showed a statistically significant (linear) change:

- Among students who rode a bicycle during the past 12 months, never or rarely work a bicycle helmet
- Never or rarely wore a seat belt when riding in a car driven by someone else
- Seriously considered attempting suicide during the past 12 months
- Made a plan about how they would attempt suicide during the past 12 months
- Suicide attempt resulted in an injury, poisoning, or overdose that had to be treated by a doctor or nurse during the past 12 months
- Ever tried cigarette smoking, even one or two puffs
- Smoked cigarettes on one or more of the past 30 days
- Smoked cigarettes on 20 or more of the past 30 days
- Among students who are current smokers, smoked more than 10 cigarettes per day on the days they smoked during the past 30 days
- Smoked cigarettes on school property on one or more of the past 30 days
- Used chewing tobacco, snuff, or dip on one or more of the past 30 days
- Had their first drink of alcohol other than a few sips before age 13 years
- Used marijuana on school property one or more times during the past 30 days
- Was offered, sold, or given an illegal drug on school property by someone during the past 12 months
- Among students who had sexual intercourse during the past three months, used a condom during last sexual intercourse
- Exercised or participated in physical activity that made them sweat and breathe hard for 20 minutes or more on three or more of the past seven days
- Among students enrolled in physical education (PE) class, actually exercised or played sports more than 20 minutes during an average PE class

⁴ Such education includes the teaching of refusal skills as well as basic factual information.

All of the changes in the above behaviors for females were in the direction of improvement.

For males, the following questions showed a statistically significant (linear) change:

- Never or rarely wore a seat belt when riding in a car driven by someone else
- Rode in a car or other vehicle driven by someone who had been drinking alcohol one or more times during the past 30 days
- Carried a weapon such as a gun, knife, or club on school property on one or more of the past 30 days
- Had property, such as their car, clothing, or books stolen or deliberately damaged on school property one or more times during the past 12 months
- In a physical fight one or more times during the past 12 months
- In a physical fight on school property one or more times during the past 12 months
- Made a plan about how they would attempt suicide during the past 12 months
- Ever tried cigarette smoking, even one or two puffs
- Smoked cigarettes on one or more of the past 30 days
- Smoked cigarettes on 20 or more of the past 30 days
- Among students who are current smokers, smoked more than 10 cigarettes per day on the days they smoked during the past 30 days
- Smoked cigarettes on school property on one or more of the past 30 days
- Used chewing tobacco, snuff, or dip on one or more of the past 30 days
- Used chewing tobacco, snuff, or dip on school property on one or more of the past 30 days
- Had at least one drink of alcohol on one or more days during their life
- Had their first drink of alcohol other than a few sips before age 13 years
- Had at least one drink of alcohol on one or more of the past 30 days
- Had five or more drinks of alcohol in a row, that is, within a couple of hours, on one or more of the past 30 days ("binge drinking")
- Sniffed glue, breathed the contents of aerosol cans, or inhaled any paints or sprays to get high one or more times during their life
- Was offered, sold, or given an illegal drug on school property by someone during the past 12 months
- Among students who had sexual intercourse during the past three months, used a condom during last sexual intercourse
- Had ever been taught in school about AIDS or HIV infection
- Trying to lose weight
- Exercised to lose weight or to keep from gaining weight during the past 30 days
- Among students enrolled in physical education (PE) class, actually exercised or played sports more than 20 minutes during an average PE class

Except for having ever been taught in school about AIDS or HIV infection (the percentage of which decreased from 1997 to 2005), the changes in the above behaviors for males were in the direction of improvement.

See the "Trend Report" section of the 2005 Iowa YRBS statistical report for details on the magnitudes of the gender-specific changes (Centers for Disease Control and Prevention, 2005).

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APPENDIX

The 2005 Iowa Youth Risk Behavior Survey